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THE EFFECT OF ENDPLATE PRESELECTION WHEN MEASURING SUPINE VERSUS STANDING COBB ANGLE CHANGE IN IDIOPATHIC SCOLIOSIS

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Objectives
The primary aim of this study was to determine whether endplate pre-selection makes a difference to the Cobb Angle change between supine and standing which is known to occur in idiopathic scoliosis. A secondary aim of this study was to identify which (if any) patient characteristics were correlated with supine *versus* standing Cobb change.

Methods
Female Adolescent Idiopathic Scoliosis (AIS) patients with right-sided thoracic major curves were included in the retrospective study. Clinically measured Cobb Angles from existing standing coronal radiographs and fulcrum bending radiographs [1] were compared to existing low-dose supine CT scans taken within 3 months of the reference radiograph. Reformatted coronal CT images were used to measure supine Cobb Angle variability with and without endplate pre-selection (end-plates selected on the radiographs used on the CT images). Inter and intra-observer measurement variability was assessed. Multi-linear regression was used to investigate whether there was a relationship between supine to standing Cobb Angle change and patient characteristics (SPSS, v.21, IBM, USA).

Results
Fifty-two patients were included, with mean age of 14.6 (SD 1.8) years; all curves were Lenke Type 1 with mean Cobb Angle on supine CT of 41.8° (SD 6.4°) and 51.9° (SD 6.7°) on standing radiographs. The mean fulcrum bending Cobb Angle for the group was 22.6° (SD 7.5°). The 10° increase from supine to standing is consistent with existing literature. Pre-selecting vertebral endplates was found to increase the mean signed Cobb change by 0.6° (SD 2.3, range -9 to 6)° and the absolute Cobb change by 1.4° (SD 1.9, range 0 to 9)°. Multi-linear regression revealed a statistically significant relationship between supine to standing Cobb Angle change with: fulcrum flexibility ($p=0.001$), age ($p=0.027$) and standing Cobb Angle ($p<0.001$). In patients with high fulcrum flexibility scores, the supine to standing Cobb Angle change was as great as 20°. The 95% confidence intervals for intra-observer and inter-observer measurement variability were 3.1° and 3.6°, respectively.

Conclusion
Pre-selecting vertebral endplates causes only has a minor effect on supine to standing Cobb change in scoliosis. There is a statistically significant relationship between supine to standing Cobb Angle change and fulcrum flexibility. Therefore, supine to standing Cobb Angle change can be considered as a measure of spinal flexibility when both standing and supine images are clinically available.

References
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